



Alternative 17

## Alternative 17 - Summary

# Delta Protection and Water Management

### Emphasis

This alternative emphasizes basic improvements to levees and channels, modification of upstream reservoir releases, installation of flow barriers to improve water quality in the Delta, and improvement in Delta aquatic and terrestrial habitat.

### Distinguishing Features

This alternative is intended to provide a low level of resource improvement and conflict resolution.

Physical/Structural	Operational/Management	Institutional/Policy
<ul style="list-style-type: none"> <li>• Basic level of levee improvement</li> <li>• Basic aquatic and wetland habitat restoration in the Bay, the Delta, and in the Sacramento and San Joaquin Rivers</li> <li>• Screens on high priority diversions to reduce fish entrainment</li> <li>• Flow barriers in south Delta to maintain water quality</li> </ul>	<ul style="list-style-type: none"> <li>• Manage existing reservoir releases to improve water quality and habitat quality</li> <li>• Real time management to reduce entrainment</li> <li>• Modify Clifton Court Forebay operations to reduce entrainment and predation</li> <li>• Groundwater banking and conjunctive use to improve water supply flexibility</li> <li>• Water conservation, reclamation, and land retirement to enhance water supply reliability</li> </ul>	<ul style="list-style-type: none"> <li>• Pollutant source controls and enforcement for agricultural drainage, establish water quality BMPs, pest control, and remediate on-site mine drainage</li> <li>• Institutional mechanisms to implement water transfers</li> <li>• Funded levee improvements, emergency management plan, and landside buffer zones to reduce system vulnerability</li> </ul>

### Benefits

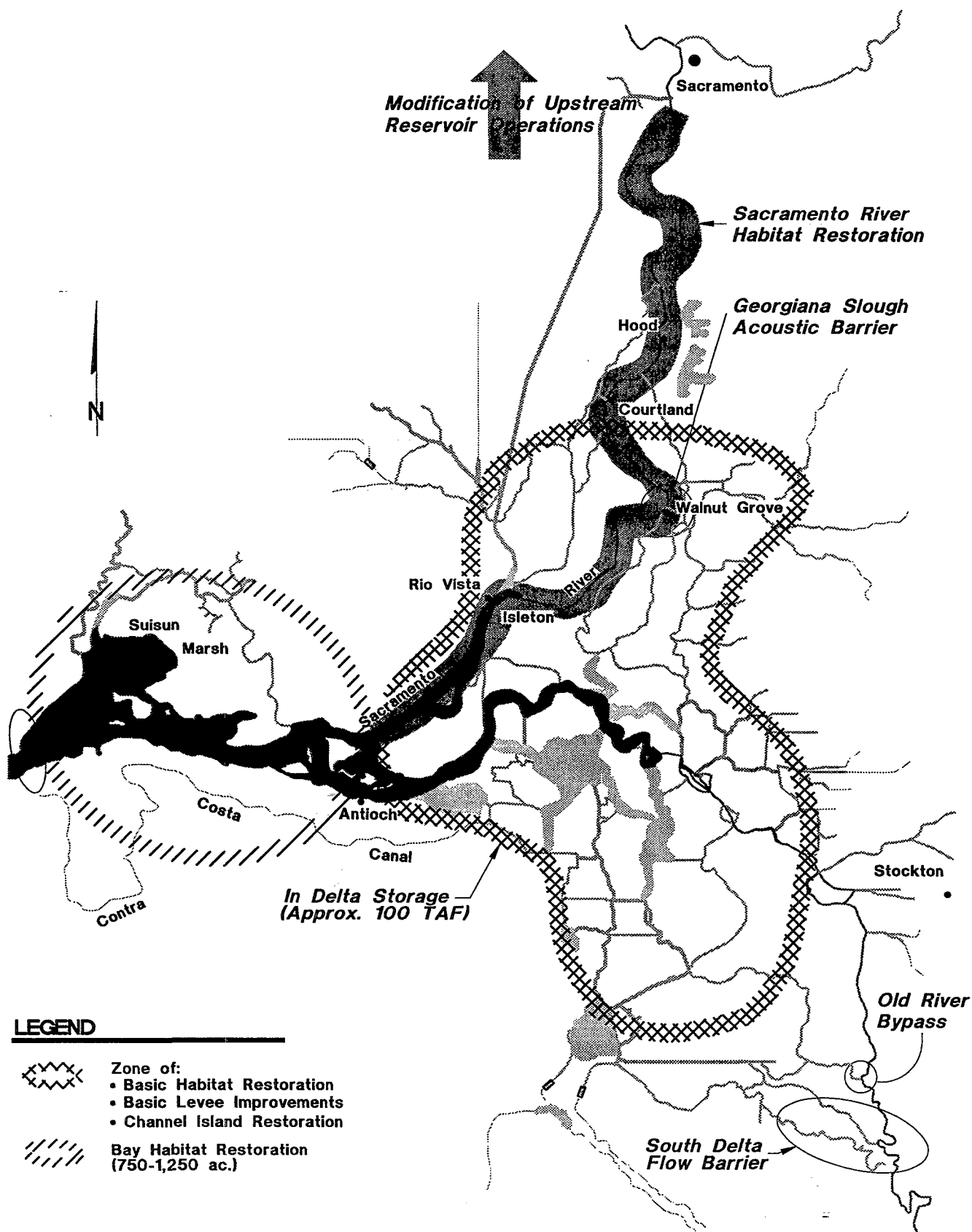
- Protects Delta levees and physical configurations and land uses
- Improves highest priority Delta and Sacramento River habitat and flow conditions for anadromous fish
- Enhances basic water supply reliability and flexibility through demand management and reduced need for releases for through-Delta carriage water
- Improves water quality in the Delta

### Constraints and Concerns

- Fish mortality at South Delta export facilities remains high
- Uncertain operational costs and benefits of reoperating existing reservoirs
- Uncertain environmental benefits and impacts of flow barriers
- Minimal improvement of fish populations through habitat restoration
- Export capacity remains constrained
- Uncertain level of improvement in water quality

# Water Management

## Alternative 17



## Alternative 17

## Delta Protection and Water Management

## Overview

This alternative emphasizes management of Bay-Delta water quality by modifying releases from existing upstream reservoirs and installing barriers at Delta locations that are crucial to in-Delta water quality. Tidal gates and flow barriers will be installed in the south Delta to improve flow circulation.

*manage Bay-Delta water quality*

Upstream reservoir releases will be operated as needed to improve upstream anadromous fish habitat conditions (e.g. flow and temperature), transport fish through the Delta and improve water quality. Improved flow conditions in upstream and in-Delta aquatic habitat will substantially increase populations of key fish species.

*existing reservoirs operated to improve flow conditions*

This alternative includes basic actions to address habitat restoration upstream and in the Delta and improve Delta levee reliability. Approximately 100 miles of levees in the Delta will be rebuilt to improve flood protection and increase the extent of shallow water, riverine, and riparian habitats. Levee protection will focus on western Delta islands critical for water quality and other islands with both regional infrastructure facilities and valuable habitat. Tidal wetlands will be restored along Suisun Bay, and a subsidence management program will gradually reduce flooding risk on Delta islands and increase wetland habitat.

*basic levels of habitat and levee improvement*

To further reduce entrainment impacts at existing diversion locations, fish screens will be installed on high priority diversions throughout the Bay-Delta system. Behavioral fish-movement barriers or functional equivalents will be evaluated for use at the head of Old River, Georgiana Slough, Threemile Slough, and on the Delta Cross Channel. Forebay operations at the export diversion facilities will be modified to reduce fish losses at the export pumps.

*fish screens and barriers benefit fish*

The alternative includes a modest program of demand management actions. These focus primarily on water conservation and retirement of marginally productive lands, especially those that contribute substantially to regional drainage and water quality problems. Groundwater banking, conjunctive use, and water transfers will also be used to enhance water supplies. Pollutant source controls will be implemented to reduce adverse effects of agricultural, urban, and mine drainage on water quality.

*demand management and groundwater banking and conjunctive use*

By modifying and improving flow conditions that control water quality upstream and in the Delta, this alternative provides benefits for all uses of Bay-Delta system resources. These actions will substantially increase habitat quality and productivity while enhancing water quality for in-Delta uses and for exports. The water quality actions will be balanced by habitat restoration and levee improvement actions.

*benefits for each of four objective areas*

## Physical and Structural Features

### Habitat Restoration

Activities	Benefits
<ul style="list-style-type: none"> <li>Restore riparian, shaded riverine, and shallow water habitat along the <b>Sacramento River channel</b> between Sacramento and Collinsville</li> </ul>	<ul style="list-style-type: none"> <li>Improves aquatic and wetland habitat quality and ecosystem productivity</li> <li>Increases survival and spawning success of anadromous and Delta native fish</li> </ul>
<ul style="list-style-type: none"> <li>Restore <b>Delta</b> shallow water, riparian, terrestrial, and tidal wetland habitat</li> </ul>	<ul style="list-style-type: none"> <li>Provides spawning and rearing areas for Delta native fish as well as forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality</li> </ul>
<ul style="list-style-type: none"> <li>Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along <b>Delta levees</b></li> </ul>	<ul style="list-style-type: none"> <li>Provides spawning areas for Delta native and other habitat fish as well as forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality</li> </ul>
<ul style="list-style-type: none"> <li>Protect <b>channel islands</b> from erosion and enhance habitat</li> </ul>	<ul style="list-style-type: none"> <li>Provides habitat for aquatic and terrestrial plant and animal species</li> <li>Improves water quality</li> </ul>
<ul style="list-style-type: none"> <li>Restore about 750 to 1,250 acres of tidal wetlands in <b>Suisun Bay</b></li> </ul>	<ul style="list-style-type: none"> <li>Provides wet-year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g., canvasback and redhead ducks)</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li><b>Sacramento River Channel</b> – Feasible and cost-effective habitat restoration implemented between Sacramento and Collinsville.</li> <li><b>Delta</b> – Candidate areas include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Candidate areas for Delta levee habitat restoration include Twitchell Island along Threemile Slough, Sevenmile Slough, and the North and South Forks of the Mokelumne River.</li> <li><b>Floodway Corridors</b> – Habitat restoration must not impair capacity of floodways.</li> <li><b>Suisun Bay</b> – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait.</li> </ul>	

**Water Storage**

Activities	Benefits
<ul style="list-style-type: none"> <li>Develop about 100,000 AF of <b>new water storage</b> in the Delta dedicated to environmental uses</li> </ul>	<ul style="list-style-type: none"> <li>Provides additional diversion flexibility</li> <li>Reduces entrainment of fish</li> <li>Reduces frequency and duration of export curtailments, thus improving water supply reliability</li> <li>Improves fish transport through the Delta</li> <li>Could significantly improve response time (compared to Folsom and Shasta reservoirs) for releasing water for improved management of X2</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Locate new Delta storage reservoir near export pumps on one or more islands such as Bacon, Mandeville, or Victoria.</li> <li>Divert water during November, December, and January; release water from March to July as needed. With real-time monitoring, release water to move fish or release for diversion.</li> <li>Environmentally dedicated water storage in the Delta allows reduction in diversions during critical periods.</li> <li>Creation of a wide riparian and shallow water habitat corridor around the perimeter of Delta island storage would provide additional benefits.</li> </ul>	

**Water Transport**

Activities	Benefits
<ul style="list-style-type: none"> <li>Construct <b>tide gates and/or flow barriers</b> in south Delta</li> </ul>	<ul style="list-style-type: none"> <li>Better manage flow circulation</li> <li>Increases water stages for south Delta diversions</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Operation of barriers coordinated with in-Delta and anadromous fishery needs through real time monitoring.</li> <li>Potential benefits of barriers need to be verified.</li> </ul>	

**Fish Protection and Transport**

Activities	Benefits
<ul style="list-style-type: none"> <li>Construct a <b>San Joaquin River bypass</b> at the head of Old River</li> </ul>	<ul style="list-style-type: none"> <li>Encourages out-migrating fish to stay in the San Joaquin River</li> <li>Allows for managing flows down Old River</li> </ul>
<ul style="list-style-type: none"> <li>Install <b>fish screens</b> on highest priority diversions in the Delta, rivers, and tributaries</li> </ul>	<ul style="list-style-type: none"> <li>Reduces entrainment of fish</li> </ul>
<ul style="list-style-type: none"> <li>Improve <b>drainage in floodway corridors</b></li> </ul>	<ul style="list-style-type: none"> <li>Reduces fish stranding</li> </ul>

Activities	Benefits
<ul style="list-style-type: none"> <li>Evaluate, improve, and install <b>behavioral barriers</b> for anadromous fish</li> </ul>	<ul style="list-style-type: none"> <li>Diverts anadromous fish from areas of potential entrainment and predation</li> <li>Allows for continued water diversions at current locations</li> </ul>
<ul style="list-style-type: none"> <li>Manage releases from existing reservoirs to better transport fish</li> </ul>	<ul style="list-style-type: none"> <li>Improves movement and transport of fish to increase population productivity</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Select diversions for screening according to criteria including size of intake, location, peril to fish, and screening feasibility.</li> <li>Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough.</li> <li>Evaluate behavioral barriers for Delta Cross Channel and Threemile Slough.</li> </ul>	

### ***Flood Protection and Levee Stabilization***

Activities	Benefits
<ul style="list-style-type: none"> <li>Provide a <b>basic level of protection and stabilization</b> of Delta levees through levee maintenance and stabilization actions</li> </ul>	<ul style="list-style-type: none"> <li>Manages vulnerability of Delta land use and infrastructure</li> <li>Manages vulnerability of Delta water supply to salinity intrusion</li> <li>Manages vulnerability of Delta ecosystem functions</li> <li>Provides opportunities for habitat restoration</li> </ul>
<ul style="list-style-type: none"> <li><b>Maintain flood conveyance capacity</b> of Delta channels through channel maintenance actions or in conjunction with levee stabilization</li> </ul>	<ul style="list-style-type: none"> <li>Manages vulnerability of Delta functions</li> <li>Maintains flood conveyance</li> <li>Provides opportunities for habitat restoration</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Provide flood protection equivalent to Army Corps of Engineers PL 99 standard for these islands: <ul style="list-style-type: none"> <li>Critical western islands with important regional infrastructure (e.g., Highway 160) such as Sherman Island</li> <li>Islands with both valuable habitat and important regional infrastructure (e.g., I-5) such as New Hope Tract</li> </ul> </li> <li>Upgrade all other Delta levees to meet at least the Hazard Mitigation Plan (HMP) standards.</li> <li>Integrate protection and stabilization of levees with Delta habitat restoration activities.</li> <li>Provide stable funding mechanism for ongoing levee and habitat monitoring, maintenance, and management.</li> </ul>	

## Operational and Management Features

### Water Supply Management

Activities	Benefits
<ul style="list-style-type: none"> <li>Expand groundwater storage and conjunctive use supply programs</li> </ul>	<ul style="list-style-type: none"> <li>Provides flexibility needed to respond to operational requirements for changing timing of diversions</li> </ul>
<ul style="list-style-type: none"> <li>Modify timing of reservoir releases</li> </ul>	<ul style="list-style-type: none"> <li>Improves Delta water quality through dilution and salinity repulsion and improved instream aquatic habitat benefits</li> </ul>
<ul style="list-style-type: none"> <li>Expand water conservation best management practices (BMPs) and implement and expand efficient water management practices (EWMPs)</li> </ul>	<ul style="list-style-type: none"> <li>Reduces demand for water from the Delta</li> </ul>
<ul style="list-style-type: none"> <li>Implement feasible reclamation and reuse projects for urban and agricultural supplies</li> </ul>	<ul style="list-style-type: none"> <li>Reduces demand for water from the Delta</li> </ul>
<ul style="list-style-type: none"> <li>Integrate land retirement and land fallowing programs with existing programs such as CVPIA and San Joaquin Drainage Program</li> </ul>	<ul style="list-style-type: none"> <li>Reduces demand for water from the Delta</li> <li>Improves water quality</li> <li>Increases flexibility of water supplies</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Use real time monitoring for reservoir releases to improve water quality and ecosystem flow management.</li> <li>Coordinate surface water releases with groundwater storage releases.</li> <li>Possible state and federal cosponsorship for conservation and reclamation programs</li> <li>Land retirement and land fallowing will focus on marginal agricultural lands and lands from willing sellers.</li> </ul>	

### Water Diversion Management

Activities	Benefits
<ul style="list-style-type: none"> <li>Improve <b>real-time monitoring</b> to determine locations of special-concern fish species and modify water diversions to reduce fish entrainment</li> </ul>	<ul style="list-style-type: none"> <li>Reduces entrainment of special-concern fish species</li> <li>Improves flexibility to divert water during periods when fish are not vulnerable</li> </ul>
<ul style="list-style-type: none"> <li>Improve <b>CVP and SWP operations</b> through predation control, coordinating operations, and improving fish salvaging and handling</li> </ul>	<ul style="list-style-type: none"> <li>Reduces fish losses</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough.</li> <li>Evaluate barriers for Delta Cross Channel and Threemile Slough.</li> </ul>	



## Fisheries Management

Activities	Benefits
<ul style="list-style-type: none"> <li>• Mark salmon produced in hatcheries</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitates selective catch of hatchery salmon by commercial and recreational fisheries</li> </ul>
<ul style="list-style-type: none"> <li>• Conduct net-pen rearing of striped bass to supplant natural production</li> </ul>	<ul style="list-style-type: none"> <li>• Maintains recreational fishery</li> <li>• Reduces operational constraints on water diversions</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Actions are intended to maintain recreational and commercial fisheries as well as enhance native salmon stocks.</li> <li>• Need to assess impact of incidental mortality on native (unmarked) fish.</li> </ul>	

## Institutional and Policy Features

### Habitat Programs

Activities	Benefits
<ul style="list-style-type: none"> <li>• Integrate recommended <b>habitat restoration actions from other programs</b>, including the Anadromous Fish Restoration Program</li> </ul>	<ul style="list-style-type: none"> <li>• Provides additional habitat restoration</li> </ul>
<ul style="list-style-type: none"> <li>• Establish programs to <b>preserve agricultural land uses</b> that provide valuable habitat functions</li> </ul>	<ul style="list-style-type: none"> <li>• Protects existing habitats</li> </ul>
<ul style="list-style-type: none"> <li>• Establish a CALFED team to coordinate and <b>expedite habitat restoration permits</b></li> </ul>	<ul style="list-style-type: none"> <li>• Accelerates acquiring permits for environmental restoration projects and other CALFED projects</li> </ul>
<ul style="list-style-type: none"> <li>• Establish and fund a management program and rapid response team to <b>manage introduced species</b></li> </ul>	<ul style="list-style-type: none"> <li>• Protects existing valuable species and habitat</li> </ul>
<ul style="list-style-type: none"> <li>• Establish a program to identify and use clean <b>dredge materials</b> from the Delta for habitat restoration and levee maintenance in the Delta</li> </ul>	<ul style="list-style-type: none"> <li>• Provides materials for habitat and levee improvements</li> </ul>
<ul style="list-style-type: none"> <li>• Encourage farmers and levee maintenance districts to <b>leave habitat areas undisturbed</b> by working with resource agencies</li> </ul>	<ul style="list-style-type: none"> <li>• Protects existing habitats</li> <li>• Increases flexibility in maintenance programs</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Coordinate activities to avoid duplication of effort.</li> </ul>	

## Water Quality Standards

Activities	Benefits
<ul style="list-style-type: none"> <li>• Reevaluate Delta export/inflow ratios during triennial reviews as habitat effectiveness is realized</li> </ul>	<ul style="list-style-type: none"> <li>• Allows for higher level of water transfer as fishery populations improve</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Monitor to verify effectiveness of habitat and entrainment reduction programs. Develop an adaptive management program to modify habitat restoration and export/inflow ratios in response to improved sustainability of important species.</li> </ul>	

## Management of System Vulnerability

Activities	Benefits
<ul style="list-style-type: none"> <li>• Establish and fund an <b>emergency levee management plan</b> to respond to levee failures</li> </ul>	<ul style="list-style-type: none"> <li>• Provides resources to protect Delta functions through proactive and preventative measures</li> </ul>
<ul style="list-style-type: none"> <li>• Establish <b>landside buffer zones</b> adjacent to levees on islands with deep peat soils</li> </ul>	<ul style="list-style-type: none"> <li>• Provides increase in stability of Delta levees and reliability of Delta functions by reducing subsidence adjacent to levees</li> <li>• Buffer could be used to provide habitat benefit</li> </ul>
Considerations	
<ul style="list-style-type: none"> <li>• Determine extent and cost effectiveness of levee management programs and buffer zones.</li> <li>• Buffer strips approximately 75 to 100 yards wide dedicated to shallow wetlands.</li> </ul>	

## Preliminary Assessment

### Benefits

- Protects Delta levees and physical configurations and land uses
- Improves highest priority Delta and Sacramento River habitat and flow conditions for anadromous fish
- Enhances basic water supply reliability and flexibility through demand management and reduced need for releases for through-Delta carriage water
- Improves water quality in the Delta

### Constraints and Concerns

- Fish mortality at South Delta export facilities remains high
- Uncertain operational costs and benefits of reoperating existing reservoirs
- Export capacity remains constrained
- Uncertain environmental benefits and impacts of flow barriers
- Minimal improvement of fish populations through habitat restoration
- Uncertain level of improvement in water quality